

## **Uinta Basin Emission Characterization: Helicopter Flyover with IR Camera Project Proposal**

Phone call with Bryce Byrd and Brock LeBaron, UDAQ on 1/15/16

### **PURPOSE**

- Provide update on NEPA intersection with air quality challenges in the Uinta Basin.
- Give you a heads up on conversations with BLM on a project proposal idea - Helicopter flyover with InfraRed (IR) camera to find “super-emitters” and fix them.

### **NEPA**

- MOU among the BLM, USFWS, USFS, NPS and EPA: “Air Quality Analyses and Mitigation for Federal Oil & Gas Decisions through the NEPA Process”. Region 8 has been the most active office in EPA, performing ~25 technical air quality analyses with our federal partners under the procedures of this MOU since it was signed in June 2011
- Three projects in the pipeline for EPA cooperating-agency review
  - Newfield’s Monument Buttes Final EIS: + 5,750 wells
  - EOG Resources’ Greater Chapita Wells Draft EIS: + ~2,800 wells
  - Crescent Point’s project (not to scoping stage yet): + ~3,000-5,000 wells.

### **CURRENT AIR WORK in UINTA BASIN**

- EPA R8 is working on a U&O reservation-specific FIP - minimize the discrepancy between the control requirements on the U&O Indian Reservation and those required by Utah Department of Environmental Quality Division of Air Quality (UDAQ).
- Multi-stakeholder Uinta Basin Emission Inventory workgroup in place and first phase of inventory underway – will be eventual baseline for anticipated future SIP/FIP demonstration efforts when basin designated nonattainment. Critical in identifying pragmatic, effective policy to reduce emissions.
- Oil & gas air emission research showing two phenomena:
  - Researchers in the Uinta Basin have shown discrepancy between top-down and bottom-up emission estimates<sup>1</sup>. There appear to be significant emissions of VOC and methane that are not represented in the emissions inventory used as input for the ozone models.
  - Researchers across the U.S. have observed skewed emission distributions, fat tail, “super-emitters” where a small % of sources account for a large % of emissions<sup>2</sup>. It is a challenge to identify the impacts of super-emitters because these maintenance-related emission sources are not fixed in time or space.

### **PROJECT PROPOSAL - Helicopter Flyover with IR Camera to Find & Fix Super-Emitters**

- Informs emission inventory work – currently no accounting for super-emitters in Uinta Basin emission inventory.
- Learn about root causes of super-emitters to prevent in future through maintenance practices.

- Fills time-gap in obtaining emission reductions – “Find & Fix” could occur in 2016 before EPA U&O-specific FIP requirements might come into effect in late-2017/2018.
- EPA R8 briefed BLM Utah office and they are supportive of this idea, think it’s a good way to tackle fugitive leaks, and would like to try agency funding (rather than by operators). They see it as appropriate to be the lead in this but wanted to talk with UDAQ about this before putting much effort into it.
- Hence our call today to give you a heads up. No decisions have been made.
- EPA has developed a project plan
  - \$105k total estimate to be cost-shared amongst agencies.
  - Covers ~50% of oil & gas wells representative of operator, age, production volume, well type (incl. abandoned) and >50% of compressor stations and gas plants.
- Precedence – Helicopter Flyovers with IR Camera in Oil & Gas Fields
  - TCEQ – 16 campaigns – started as “Find & Fix”, now moving into enforcement.
  - EPA R6 – 5 campaigns.
  - TCEQ and R6 found that ~10% of facilities flown-over had IR-observed emissions from air.
  - Researchers – 7 campaigns (to be published).
  - Industry directly contracts for flyover of operations (e.g. gas gathering pipeline systems).

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<sup>1</sup> Airborne measurements ~8.9% of gas produced to atmosphere compared to GHGRP-W ~ 1.0%.  
Karion, A., et al. (2013), *Methane emissions estimate from airborne measurements over a western United States natural gas field*, Geophys. Res. Lett., 40, 4393–4397, doi:10.1002/grl.50811.  
Ozone modeling shows low negative bias for VOCs and methane by factor of 1.8 and 4.8 respectively.  
Ahmadov, R., et al. (2015), *Understanding high wintertime ozone pollution events in an oil and natural gas producing region of the western U.S.* Atmospheric Chemistry and Physics

<sup>2</sup> Wellpads [86 natural gas wellsites ... ~5% sites → ~60% of emissions] – Rella, C., et al (2015), *Measuring emissions from oil and natural gas producing well pads in the Barnett Shale region using the novel mobile flux plane technique*. Environ. Sci. Technol. 2015, 49, 4742– 4748, DOI: 10.1021/acs.est.5b00099  
Midstream Compressor Stations [114 CSs ... 30% sites → ~80% of emissions] - Mitchell, A., et al. (2015), *Measurements of Methane Emissions from Natural Gas Gathering Facilities and Processing Plants: Measurement Results*. Environmental Science & Technology.  
Gas Plants [16 gas processing plants ... 45% sites → ~80% of emissions] - Mitchell, A., et al. (2015), *Measurements of Methane Emissions from Natural Gas Gathering Facilities and Processing Plants: Measurement Results*. Environmental Science & Technology.  
Transmission Compressor Stations [45 CSs ... 10% sites → ~ 50% of emissions] – Subramanian, R., et al. (2015), *Methane Emissions from Natural Gas Compressor Stations in the Transmission and Storage Sector: Measurements and Comparisons with the EPA Greenhouse Gas Reporting Program Protocol*. Environmental Science & Technology.  
Abandoned Wells [19 abandoned wells... 3 of the 19 wells had CH<sub>4</sub> flow rates three orders of magnitude larger than the median flow rate] – Kang, M., et al. (2014), *Direct measurements of methane emissions from abandoned oil and gas wells in Pennsylvania*. PNAS.  
Well Liquid Unloading [107 wells with liquid unloadings ... w/o plunger lift: 20% wells → 83% of emissions; w/ plunger lift and manual: 20% wells → 65% of emissions; w/ plunger lift and automatic: 20% wells → 72% of emissions – Allen, D., et al. (2014) *Methane Emissions from Process Equipment at Natural Gas Production Sites: Liquid Unloadings*. Environmental Science & Technology.  
Pneumatic Controllers [377 controllers ... 20% devices → 96% of emissions] - Allen, D., et al. (2014), *Methane*

*Emissions from Process Equipment at Natural Gas Production Sites in the United States: Pneumatic Controllers.*  
Environmental Science & Technology.